CLAIMS

1. A method of high-efficiency wireless frequency division multiplexing, comprising: transmitting, from an access point to a first wireless device and a second wireless device, a reference signal for reserving an entire wireless medium including a set of wireless frequencies available for use by both the first and second wireless devices, the reference signal including an indication of a power level at which at least one of the first and second wireless devices should transmit communications, and the reference signal further comprising a data frame including a frame control field, a duration field, a receive address field, a transmit address field, a length field, a STA info field, one or more optional padding bits, and a frame check sequence (FCS); in response to transmitting the reference signal, receiving, at the access point from the first wireless device, a first communication on a first subset of the set of wireless frequencies; in response to transmitting the reference signal, receiving, at the access point from the second wireless device, a second communication on a second subset of the set of wireless frequencies, the first subset of wireless frequencies and the second subset of wireless frequencies being mutually exclusive subsets of the set of wireless frequencies, and the access point receiving the first and second wireless communications at times that at least partially overlap, and transmitting, from the access point on only the first subset of wireless frequencies, a single broadcast acknowledgment of both the first and second communications.

2. The method of claim 1, further comprising assigning the first and/or second subsets of wireless frequencies to the first or second device, respectively.

3. The method of claim 1, further comprising receiving an indication of the first or second subsets of wireless frequencies from the first or second device, respectively.

4. The method of claim 1, the first wireless device comprising a legacy device incapable of simultaneously transmitting on the entire set of wireless frequencies available for use by both the first and second wireless device.

5. The method of claim 1, exchanging at least one frame reserving a wireless medium comprising receiving a ready-to-send (RTX) frame from at least one of the first and second device.

6. The method of claim 5, the ready-to-send (RTX) frame comprising one or more of: a frame control field, a duration field, a source address field, a destination address field, and an information payload comprising one or more of the following indications: a requested transmission time, the size of the queues for transmission, a quality-of-service (QoS) indication for the requested transmission, and a requested transmission bandwidth.

7. The method of claim 5, the ready-to-send (RTX) frame comprising a data frame including a high throughput control (HTC) field with an indication reverse decision grant (RDG)=1.

8. The method of claim 1, wherein the reference signal includes a high throughput control (HTC) field with an indication reverse decision grant (RDG)=1.

9. The method of claim 1, the reference signal comprising at least a portion of a power save multi-poll (PSMP) frame, a PSMP-UTT start offset within a STA info field identifying the start time for uplink frequency division multiple access (UL FDMA) transmissions, a PSMP-UTT duration identifies the duration of the UL FDMA transmission, and a STA ID field comprising an identifier of STAs allowed to transmit.

10. The method of claim 1, the reference signal comprising an indication of a deferral time for third party devices.

11. The method of claim 1, the reference signal comprising an indication of devices that are eligible to transmit at a particular time.

12. The method of claim 1, the reference signal comprising an assignment of channels to a set of wireless devices including one or more devices each capable of using the second subset of wireless frequencies.

13. The method of claim 1, the reference signal comprising an indication of a transmission time of at least one device in the set of wireless devices.

14. The method of claim 1, the reference signal comprising a clear-to-send frame (CTS).

15. The method of claim 1, the reference signal comprising a clear-to-send frame (CTS) and an extended payload comprising one or more payload elements.

16. The method of claim 1, the reference signal comprising a clear-to-send frame (CTS) comprising a high-throughput control (HTC) field indicating one or more target devices.

17. The method of claim 1, the reference signal comprising an aggregated media access control protocol data unit (A-MPDU) comprising a clear-to-send frame (CTS) and one or more payload elements.

18. The method of claim 1, further comprising scheduling a time at which to receive communications from the first and second wireless device.

19. The method of claim 1, further comprising scheduling a time at which to receive communications from the first and second wireless device and transmitting a reference signal to the first and second wireless device at the scheduled time.

20. The method of claim 1, further comprising receiving, from at least one device, an indication that the at least one device is ready to send data.

21. The method of claim 1, further comprising receiving, from at least one device, a quality-of-service (QoS) field indicating that the at least one device is ready to send data.

22. The method of claim 1, further comprising receiving, from at least one device, a power-save poll (PS-Poll) frame indicating that the at least one device is ready to send data.

23. An access point configured to perform high-efficiency wireless frequency division multiplexing, comprising: a processor; a transmitter configured to transmit, to a first wireless device and a second wireless device, a reference signal for reserving an entire wireless medium including a set of wireless frequencies available for use by both the first and second wireless devices, the reference signal including an indication of a power level at which at least one of the first and second wireless devices should transmit communications, and the reference signal further comprising a data frame including a frame control field, a duration field, a receive address field, a transmit address field, a length field, a STA info field, one or more optional padding bits, and a frame check sequence (FCS); a receiver configured to: in response to transmitting the reference signal, receive, from the first wireless device, a first communication on a first subset of the set of wireless frequencies; and in response to transmitting the reference signal, receive, from the second wireless device, a second communication on a second subset of the set of wireless frequencies, the first subset of wireless frequencies and the second subset of wireless frequencies being mutually exclusive subsets of the set of wireless frequencies, and the access point receiving the first and second wireless communications at times that at least partially overlap, the transmitter being further configured to transmit, on only the first subset of wireless frequencies, a single broadcast acknowledgment of both the first and second communications.

24. The access point of claim 23, the processor being further configured to assign the first or second subsets of wireless frequencies to the first or second device, respectively.

25. The access point of claim 23, the receiver being further configured to receive an indication of the first or second subsets of wireless frequencies from the first or second device, respectively.

26. The access point of claim 23, the first wireless device comprising a legacy device incapable of simultaneously transmitting on the entire set of wireless frequencies available for use by both the first and second wireless device.

27. The access point of claim 23, exchanging at least one frame reserving a wireless medium comprising receiving a ready-to-send (RTX) frame from at least one of the first and second device.

28. The access point of claim 27, the ready-to-send (RTX) frame comprising one or more of: a frame control field, a duration field, a source address field, a destination address field, and an information payload comprising one or more of the following indications: a requested

transmission time, the size of the queues for transmission, a quality-of-service (QoS) indication for the requested transmission, and a requested transmission bandwidth.

29. The access point of claim 27, the ready-to-send (RTX) frame comprising a data frame including a high throughput control (HTC) field with an indication reverse decision grant (RDG)=1.

30. The access point of claim 23, wherein the reference signal includes a high throughput control (HTC) field with an indication reverse decision grant (RDG)=1.

31. The access point of claim 23, the reference signal comprising at least a portion of a power save multi-poll (PSMP) frame, a PSMP-UTT start offset within a STA info field identifying the start time for uplink frequency division multiple access (UL FDMA) transmissions, a PSMP-UTT duration identifies the duration of the UL FDMA transmission, and a STA ID field comprising an identifier of STAs allowed to transmit.

32. The access point of claim 23, the reference signal comprising a frame control field, a duration field, a receive address field, a transmit address field, a length field, a STA info field, one or more optional padding bits, and a frame check sequence (FCS).

33. The access point of claim 23, the reference signal comprising an indication of a deferral time for third party devices.

34. The access point of claim 23, the reference signal comprising an indication of devices that are eligible to transmit at a particular time.

35. The access point of claim 23, the reference signal comprising an indication of a power level at which at least one device should transmit.

36. The access point of claim 23, the reference signal comprising an assignment of channels to a set of wireless devices including one or more devices each capable of using the second subset of wireless devices.

37. The access point of claim 23, the reference signal comprising an indication of a transmission time of at least one device in the set of wireless devices.

38. The access point of claim 23, the reference signal comprising a clear-to-send frame (CTS).

39. The access point of claim 23, the reference signal comprising a clear-to-send frame (CTS) and an extended payload comprising one or more payload elements.

40. The access point of claim 23, the reference signal comprising a clear-to-send frame (CTS) comprising a high-throughput control (HTC) field indicating one or more target devices.

41. The access point of claim 23, the reference signal comprising an aggregated media access control protocol data unit (A-MPDU) comprising a clear-to-send frame (CTS) and one or more payload elements.

42. The access point of claim 23, the processor being further configured to schedule a time at which to receive communications from the first and second wireless device.

43. The access point of claim 23, the processor being further configured to schedule a time at which to receive communications from the first and second wireless device and transmitting a reference signal to the first and second wireless device at the scheduled time.

44. The access point of claim 23, the receiver being further configured to receive, from at least one device, an indication that the at least one device is ready to send data.

45. The access point of claim 23, the receiver being further configured to receive, from at least one device, a quality-of-service (QoS) field indicating that the at least one device is ready to send data.

46. The access point of claim 23, the receiver being further configured to receive, from at least one device, a power-save poll (PS-Poll) frame indicating that the at least one device is ready to send data.

47. An apparatus for high-efficiency wireless frequency division multiplexing, comprising: means for transmitting, from an access point to a first wireless device and a second wireless device, a reference signal for reserving an entire wireless medium including a set of wireless frequencies available for use by both the first and second wireless devices, the reference signal including an indication of a power level at which at least one of the first and second wireless devices should transmit communications, and the reference signal further comprising a data frame including a frame control field, a duration field, a receive address field, a transmit address field, a length field, a STA info field, one or more optional padding bits, and a frame check sequence (FCS); means for, in response to transmitting the reference signal, receiving, at the access point from the first wireless device, a first communication on a first subset of the set of wireless frequencies; means for, in response to transmitting the reference signal, receiving a second communication on a second subset of the set of wireless frequencies, the first subset of wireless frequencies and the second subset of wireless frequencies being mutually exclusive subsets of the set of wireless frequencies, and the access point receiving the first and second wireless communications at times that at least partially overlap; and means for transmitting, from the access point on only the first subset of wireless frequencies, a single broadcast acknowledgment of both the first and second communications.

48. A non-transitory computer-readable medium comprising code that, when executed, causes an apparatus to: transmit, to a first wireless device and a second wireless device, a reference signal

for reserving an entire wireless medium including a set of wireless frequencies available for use by both the first and second wireless devices, the reference signal including an indication of a power level at which at least one of the first and second wireless devices should transmit communications, and the reference signal further comprising a data frame including a frame control field, a duration field, a receive address field, a transmit address field, a length field, a STA info field, one or more optional padding bits, and a frame check sequence (FCS); in response to transmitting the reference signal, receive, at the apparatus from the first wireless device, a first communication on a first subset of the set of wireless frequencies; in response to transmitting the reference signal, receive a second communication on a second subset of the set of wireless frequencies, the first subset of wireless frequencies and the second subset of wireless frequencies being mutually exclusive subsets of the set of wireless frequencies, and the apparatus receiving the first and second wireless communications at times that at least partially overlap; and transmit, from the apparatus on only the first subset of wireless frequencies, a single broadcast acknowledgment of both the first and second communications.